

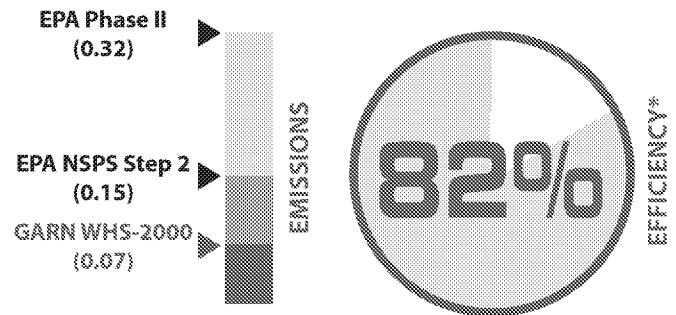
**EPA PHASE II  
&  
NSPS STEP 2  
QUALIFIED!**

- FIRST HYDRONIC WOOD HEATING UNIT TESTED WITH CORD WOOD TO BE APPROVED BY THE EPA!
- MEETS ALL EPA AND NSPS STEP 2 EMISSIONS LIMITS FOR THE YEAR 2020 AND BEYOND!
- ONLY HYDRONIC CORD WOOD UNIT LISTED TO THE CANADIAN STANDARD CSA B415.1-2010!
- EVERY WHS-1500 AND WHS-2000 BUILT SINCE 1989 MEETS THE EPA STANDARDS!
- SIMPLE AND ROBUST = MORE HEAT, LESS WOOD

**UNIT PROFILE: WHS-2000**

The WHS-2000 is our middle sized unit. It is one of the cleanest cord wood units on the EPA hydronic heater website. The larger storage volume and increased heat exchanger area means greater efficiency and heat output.

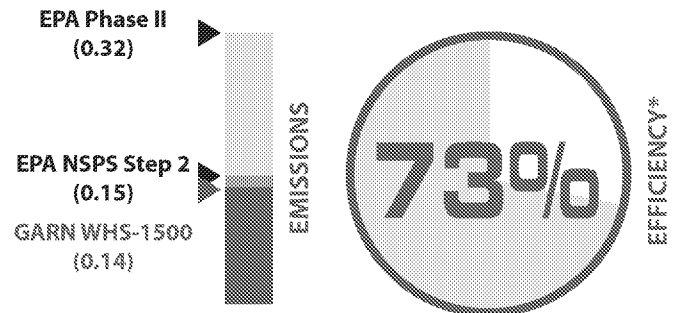
| GARN® WHS-2000     |         |           |
|--------------------|---------|-----------|
| FIRING/BURN RATE†  | 425,000 | btuh      |
| MAX. OUTPUT        | 200,000 | btuh      |
| 8-HOUR OUTPUT      | 105,050 | btuh      |
| 8-HOUR EFFICIENCY* | 76 %    | HHV       |
|                    | 82 %    | LHV       |
| EMISSIONS          | 1.69    | grams/hr  |
|                    | 0.07    | lbm/mmbtu |



**UNIT PROFILE: WHS-1500**

The WHS-1500 is a slightly smaller version of the WHS-2000 for applications and spaces that cannot accommodate a WHS-2000. The WHS-1500 emission levels still meet the EPA's Phase II and NSPS standards for the year 2020 and beyond.

| GARN® WHS-1500     |         |           |
|--------------------|---------|-----------|
| FIRING/BURN RATE†  | 350,000 | btuh      |
| MAX. OUTPUT        | 177,000 | btuh      |
| 8-HOUR OUTPUT      | 87,200  | btuh      |
| 8-HOUR EFFICIENCY* | 68 %    | HHV       |
|                    | 73 %    | LHV       |
| EMISSIONS          | 2.88    | grams/hr  |
|                    | 0.14    | lbm/mmbtu |



**\*EFFICIENCY NOTE:**

We reduced GARN's efficiency ratings from the previously published values in January 2015 because ASTM reduced the heat content of wood.

|     | OLD VALUE | NEW VALUE | CHANGE |
|-----|-----------|-----------|--------|
| LHV | 7,478     | 7,988     | 7%     |
| HHV | 8,550     | 8,600     | 1%     |

The EPA has NOT changed their LHV and HHV efficiency ratings in their test method or on their Phase II qualified website. What that means is all equipment tested to EPA Methods will appear artificially higher than GARN equipment. When comparing to EPA tested equipment add 7% to GARN's efficiency to get a comparable efficiency.

**EPA REGS., WHAT'S HAPPENING?**

|            |   |  |
|------------|---|--|
| May, 2015  | <b>Step 1: Production Stop</b><br>NSPS Becomes Federal Law.<br>Step 1 limit of 0.32 lbm/mmbtu officially implemented in US. | Mfr's must stop producing non-compliant equipment. Mfr's can still sell their existing inventory.                          |
| Jan., 2016 | <b>Step 1: Sales Stop</b>   | Mfr's CANNOT produce or sell equipment that doesn't comply with Step 1. Mfr's can no longer sell their existing inventory. |
| May 2020   | <b>Step 2: Limit of 0.10 (crib wood) or 0.15 (cord wood)</b><br>lbm/mmbtu is Federal Law.                                   | Mfr's CANNOT produce or sell equipment that doesn't comply with Step 2.  |

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"30 years of outstanding performance, and our efficiency and emissions numbers are as accurate today as they were 30 years ago."

**GARN® WHS**

## STANDARDS: WHY IS TESTING TO ASTM E2618 IMPORTANT?

There are 3 main testing protocols (standards) that hydronic wood heaters in the United States are currently tested to: EPA Method 28, ASTM E2618, and EN 303-5. Why make a big deal out of what standard a wood unit is tested to? The answer is honesty and responsibility to the consumer. The ASTM method is the only test method that's authored and approved by consumers and engineers. That means the ASTM method reflects the most honest and accurate way to test wood products that is reflective of actual, installed performance.

| TEST METHOD   | AUTHOR(S)  |
|---------------|--|
| EPA Method 28 | The EPA, a US government body  |
| EN 303-5      | A European government body   |
| ASTM E2618    | A committee composed of consumers, engineers, industry representatives, government representatives, certification labs and independent interested parties. |

## EPA QUALIFIED UNITS ARE NOT CREATED EQUAL

"On May 9, 2013, the US EPA sent requests to manufacturers of outdoor wood boilers whose equipment is listed on the EPA Phase II qualified website, to remove all EPA method 28 related efficiency claims from their websites and literature." Here's why...

Letters were sent to the EPA from independent test labs, and from GARN, that revealed fundamental flaws in EPA Method 28 and test data of the qualified units. Efficiencies were reported up to 99.9%! At the time, the EPA Outdoor Wood Hydronic Heater (OWHH) qualified website listed emissions data based on both the heat input and heat output of the units.

**A simple check was completed: divide the heat output by the heat input emissions and that should equal the efficiency of the unit. What surfaced was shocking...units tested to EPA Method 28 had deviations of up to 29% lower than their reported efficiency!** So, the EPA removed the heat input based data. Removing the data did not fix the problem, and there are still units on the qualified list that tested to EPA Method 28 and whose efficiencies and heat outputs are artificially inflated. Beware of units that do not list an 8-hour efficiency rating or report N/A in any of their data on the EPA qualified list.

GARN meets the EPA NSPS Step 2. That means our units comply with all state and Federal regulations put in place now and far into the EPA's future. Installing a GARN equals peace-of-mind and full emissions compliance.

## CLEAN TECHNOLOGY DOESN'T REQUIRE OXYGEN SENSORS

Our passion is simple...

There are many who believe burning wood cleanly and efficiently requires the use of sophisticated sensor and computer technology. Many EPA Phase II units today are gasifiers and many of those gasifiers are downdrafters where lambda or oxygen sensing technologies are used. Some of those units continually monitor the oxygen in the exhaust and are constantly, second-by-second, adjusting dampers and blower motors to try and achieve the optimum combustion efficiency. The belief is that the added complication ultimately means better efficiency for the customer, but the truth is that burning wood is harder to control and more variable than burning gasoline in a car. The

computer algorithms used with oxygen sensors assume that perfectly seasoned wood is being burned, but we all know the truth: a lot of other *stuff* can find its way into the combustion chamber. The lab is different from the real world which makes the oxygen sensors prone to plugging at which point the combustion can actually be worse because of a bad sensor. In addition, if you've ever had the oxygen sensor in your car go bad, you know that they can be expensive to replace. GARN units have a single speed blower with a single feedback sensor - a thermocouple temperature sensor. Dampers and variable speed fans may seem flashy and sophisticated, but the GARN WHS is simple, meets all EPA regulations, and just plain works.

...and our units just plain work

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